

**THAT WHICH IS CLAIMED IS:**

1. A process to produce a composition of matter, said process comprising contacting an organometal compound, a treated solid oxide compound, and an organoaluminum compound to produce said composition,

wherein said composition consists essentially of a post-contacted organometal compound, a post-contacted treated solid oxide compound, and optionally, a post-contacted organoaluminum compound, and

wherein said composition can polymerize ethylene into a polymer with an activity greater than a composition that uses the same organometal compound, and the same organoaluminum compound, but uses untreated Ketjen grade B alumina instead of said treated solid oxide compound, and

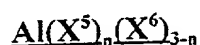
wherein said organometal compound has the following general formula



wherein  $M^1$  is selected from the group consisting of titanium, zirconium, and hafnium, and

wherein (X<sup>1</sup>) is independently selected from the group consisting of cyclopentadienyls, indenyls, fluorenyls, substituted cyclopentadienyls, substituted indenyls, and substituted fluorenyls, and wherein said substituents on said substituted cyclopentadienyls, substituted indenyls, and substituted fluorenyls, are selected from the group consisting of aliphatic groups, cyclic groups, combinations of aliphatic and cyclic groups, and organometallic groups, and hydrogen; and wherein (X<sup>3</sup>) and (X<sup>4</sup>) are independently selected from the group consisting of halides, aliphatic groups, cyclic groups, combinations of aliphatic and cyclic groups, and organometallic groups, and wherein (X<sup>2</sup>) is selected from the group consisting of Group OMC-I or Group OMC-II, and

wherein said organoaluminum compound has the following general formula.



wherein (X<sup>5</sup>) is a hydrocarbyl having from 1-20 carbon atoms, and

wherein (X<sup>6</sup>) is a halide, hydride, or alkoxide, and

wherein "n" is a number from 1 to 3 inclusive.

2. A process to produce a composition of matter, said process comprising contacting an organometal compound, a treated solid oxide compound, and an organoaluminum compound to produce said composition,

wherein said composition consists essentially of a post-contacted organometal compound, a post-contacted treated solid oxide compound, and optionally, a post-contacted organoaluminum compound, and

wherein said composition can polymerize ethylene into a polymer with an activity greater than 100 (gP/(gS·hr)), and

wherein said organometal compound has the following general formula

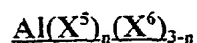


wherein M<sup>1</sup> is selected from the group consisting of titanium, zirconium, and hafnium, and

wherein (X<sup>1</sup>) is independently selected from the group consisting of cyclopentadienyls, indenyls,

fluorenyls, substituted cyclopentadienyls,  
 substituted indenyls, and substituted fluorenyls, and  
 wherein said substituents on said substituted  
 cyclopentadienyls, substituted indenyls, and  
 substituted fluorenyls, are selected from the group  
 consisting of aliphatic groups, cyclic groups,  
 combinations of aliphatic and cyclic groups, and  
 organometallic groups, and hydrogen; and  
 wherein (X<sup>3</sup>) and (X<sup>4</sup>) are independently selected  
 from the group consisting of halides, aliphatic  
 groups, cyclic groups, combinations of aliphatic and  
 cyclic groups, and organometallic groups, and  
 wherein (X<sup>2</sup>) is selected from the group consisting  
 of Group OMC-I or Group OMC-II, and

wherein said organoaluminum compound has the following general  
 formula.



wherein (X<sup>5</sup>) is a hydrocarbyl having from 1-20  
 carbon atoms, and

wherein (X<sup>6</sup>) is a halide, hydride, or alkoxide, and

wherein "n" is a number from 1 to 3 inclusive, and  
wherein said treated solid oxide compounds comprise oxygen and  
at least one element selected from the group consisting of  
groups 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 of  
the periodic table, including lanthanides and actinides.

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3. A process according to claim 2 wherein said activity is greater than 250.
4. A process according to claim 3 wherein said activity is greater than 500.
5. A process according to claim 4 wherein said activity is greater than 1000.
6. A process according to claim 5 wherein said activity is greater than 2000.
7. A composition produced by the process of claim 2.
8. A process of using the composition of claim 7 to polymerize monomers into polymers.
9. A manufacture that comprises polymers produced according to claim 8.
10. A machine that comprises manufactures according to claim 9.
11. A process according to claim 8 wherein said polymers are produced under slurry polymerization conditions.
12. A process according to claim 11 wherein said polymerization is conducted in a loop reactor.

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13. A process according to claim 12 wherein said polymerization is conducted in the presence of a diluent that comprises, in major part, isobutane.
14. A manufacture that comprises polymers produced according to claim 13.
15. A machine that comprises manufactures according to claim 14.
16. A composition produced by the process of claim 6.
17. A process of using the composition of claim 16 to polymerize monomers into polymers.
18. A manufacture that comprises polymers produced according to claim 17.
19. A machine that comprises manufactures according to claim 18.
20. A process according to claim 17 wherein said polymers are produced under slurry polymerization conditions.
21. A process according to claim 20 wherein said polymerization is conducted in a loop reactor.
22. A process according to claim 21 wherein said polymerization is conducted in the presence of a diluent that comprises, in major part, isobutane.
23. A manufacture that comprises polymers produced according to claim 22.
24. A machine that comprises manufactures according to claim 23.

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25. A process to produce a composition of matter, said process comprising contacting an organometal compound, a treated solid oxide compound, and an organoaluminum compound to produce said composition,

wherein said composition consists essentially of a post-contacted organometal compound, a post-contacted treated solid oxide compound, and optionally, a post-contacted organoaluminum compound, and

wherein said composition can polymerize ethylene into a polymer with an activity greater than 2000 (gP/(gS·hr)), and

wherein said organometal compound is selected from the group consisting of

bis(cyclopentadienyl) hafnium dichloride;

bis(cyclopentadienyl) zirconium dichloride;

[ethyl(indenyl)<sub>2</sub>] hafnium dichloride;

[ethyl(indenyl)<sub>2</sub>] zirconium dichloride;

[ethyl(tetrahydroindenyl)<sub>2</sub>] hafnium dichloride;

[ethyl(tetrahydroindenyl)<sub>2</sub>] zirconium dichloride;

bis(n-butylcyclopentadienyl) hafnium dichloride;

bis(n-butylcyclopentadienyl) zirconium dichloride;

((dimethyl)(diindenyl) silane) zirconium dichloride;

((dimethyl)(diindenyl) silane) hafnium dichloride;

((dimethyl)(ditetrahydroindenyl) silane) zirconium  
dichloride;

((dimethyl)(di(2-methyl indenyl)) silane) zirconium  
dichloride;

bis(fluorenyl) zirconium dichloride, and

wherein said organoaluminum compound is selected from the  
group consisting of

trimethylaluminum;

triethylaluminum;

tripropylaluminum;

diethylaluminum ethoxide;

tributylaluminum;

triisobutylaluminum hydride;

triisobutylaluminum;

diethylaluminum chloride, and

wherein said solid oxide compounds are selected from the group  
consisting of  $\text{Al}_2\text{O}_3$ ,  $\text{B}_2\text{O}_3$ ,  $\text{BeO}$ ,  $\text{Bi}_2\text{O}_3$ ,  $\text{CdO}$ ,  $\text{Co}_3\text{O}_4$ ,

$\text{Cr}_2\text{O}_3$ ,  $\text{CuO}$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{Ga}_2\text{O}_3$ ,  $\text{La}_2\text{O}_3$ ,  $\text{Mn}_2\text{O}_3$ ,  $\text{MoO}_3$ ,  $\text{NiO}$ ,

$\text{P}_2\text{O}_5$ ,  $\text{Sb}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{SnO}_2$ ,  $\text{SrO}$ ,  $\text{ThO}_2$ ,  $\text{TiO}_2$ ,  $\text{V}_2\text{O}_5$ ,  $\text{WO}_3$ ,



Y<sub>2</sub>O<sub>3</sub>, ZnO, ZrO<sub>2</sub>; and mixtures thereof, and wherein said treated solid oxides have been treated with fluoride or chloride or both.